

REMARKS/ARGUMENTS

This Amendment is in response to the Final Office Action mailed January 16, 2008. Claims 1-7, 12-18, and 34-39 were pending in the present application. This Amendment amends claims 1-5 and 12-16, cancels claims 6, 7, 17, and 18 without prejudice, and adds new claims 40-43, leaving pending in the application claims 1-5, 12-16, and 34-43. Applicants submit that no new matter has been added by virtue of these amendments. Reconsideration of the rejected claims is respectfully requested.

Examiner Interview

Applicants wish to thank Examiner Ahluwalia for her time and consideration during the telephonic interview with Applicants' representatives, George Yee and Andrew Lee, held on March 25, 2008. At the interview, independent claim 1 was discussed with respect to Cotner et al. (U.S. Patent No. 6,247,055, hereinafter "Cotner"). In particular, distinctions between the Cotner reference and claim 1 were discussed. The Examiner indicated that claim 1 might be allowable if amended to include the limitations of dependent claims 6 and 7; however, no specific agreement was reached. The following remarks reflect the substance of the discussion.

35 U.S.C. §103(a) Rejection of Claims 1-7, 12-18, and 34-39

Claims 1-7, 12-18, and 34-39 are rejected under 35 U.S.C. §103(a) as being unpatentable over Cotner, further in view of Vosseler (U.S. Publication No. 2003/0126240, hereinafter "Vosseler"). Applicants respectfully submit that Cotner and Vosseler, considered individually or in combination, do not teach or suggest the features of these claims.

Embodiments of the present invention are directed to techniques for maintaining high availability in a "share nothing" distributed database system comprising a plurality of storage areas and a plurality of computers. According to one set of embodiments, a first computer in the plurality of computers has running thereon a first database management program (*i.e.*, DBMS) configured to manage a first storage area in the plurality of storage areas. Further,

a second computer in the plurality of computers has running thereon a second DBMS configured to manage a second storage area in the plurality of storage areas. When a failure occurs at the first computer, preset substitution information is obtained, where the preset substitution information includes an association between the first and second DBMSs indicating that the second DBMS is to manage the first storage area in addition to the second storage area. The preset substitution information is then used to redirect requests to access the first storage area from the first DBMS to the second DBMS, thereby allowing the second DBMS to service those requests while the first DBMS is down.

In accordance with the above, Applicants independent claim 1 (as amended) recites:

A method for processing databases in a system comprising a plurality of storage areas and a plurality of computers, wherein a first computer in the plurality of computers has running thereon a first database management program (DBMS) configured to manage a first storage area in the plurality of storage areas, wherein a second computer in the plurality of computers has running thereon a second DBMS configured to manage a second storage area in the plurality of storage areas, and wherein the first and second DBMSs are configured to run concurrently, the method comprising:

receiving a request to access the first storage area, the request being directed to the first DBMS running on the first computer; and

when a failure has occurred at the first computer:

obtaining preset substitution information including an association between the first DBMS and the second DBMS, wherein the association indicates that the second DBMS is to manage the first storage area in addition to the second storage area; and

based on the preset substitution information, sending the request to the second DBMS running on the second computer, wherein the second DBMS is configured to access the first storage area and process the request.

(Applicants' claim 1, as amended, emphasis added).

At least the above features are not shown by Cotner and/or Vosseler.

Cotner is directed to a system and method for "resyncing" a client computer with a single database server that has failed and then resumed operation. (Cotner: Abstract). In the system of Cotner, each database server (*i.e.*, DBMS) is associated with a "resynchronization port

number” and a TCP/IP address. (Cotner: col. 4, lines 60-62). The resynchronization port number is an identifier that uniquely identifies the DBMS. (Cotner: col. 6, lines 62-65). The TCP/IP address corresponds to the network address of the computer system on which the DBMS is currently running. (Cotner: col. 6, lines 53-56).

As described in Cotner, a client interacting with a specific DBMS may need to resynchronize with that DBMS after the DBMS has failed and restarted in order to complete uncompleted work units. (Cotner: col. 2, lines 60-63). However, the DBMS may be restarted on a different host computer with a different network address (*i.e.*, TCP/IP address) than the one used prior to the failure. As a result, the client may not know how to reestablish communication with the restarted DBMS to carry out the resynchronization process. (Cotner: col. 3, lines 1-9). To address this, Cotner describes maintaining a global list of mappings between active resynchronization port numbers and TCP/IP addresses. Using this list, a client can determine the most up-to-date network address for a given DBMS based on its unique resynchronization port number. (Cotner: col. 4, line 60 – col. 5, line 9).

Vosseler is directed to techniques for monitoring objects in an IT network.
(Vosseler: Abstract).

Applicants submit that the inventions of Cotner and Vosseler are completely different from Applicants’ amended claim 1. For example, Cotner and Vosseler fail to teach or suggest “obtaining preset substitution information including an association between the first DBMS and the second DBMS, wherein the association indicates that the second DBMS is to manage the first storage area in addition to the second storage area” as recited in amended claim 1. In the Office Action, the Examiner asserts that these features are shown in Cotner at column 2, line 60 to column 3, line 9, column 3, lines 49-65, and Figure 2. Applicants respectfully disagree.

Column 2, line 60 to column 3, line 9 of Cotner recites:

When a communication failure occurs during the two-phase commit process, the client must “resynchronize” with the member of the sysplex that owns the log records associated with the client’s unit of work. The resynchronization process allows the client to determine the outcome (success or failure) of the unit of work at the DBMS server. In order to perform

resynchronization, the client must re-establish communications with the member of the DBMS sysplex that performed the original unit of work. It may be difficult for the client to connect to the correct member of the sysplex for several reasons. First, the required member of the DBMS sysplex may not be active when the client attempts resynchronization. Second, the required member of the DBMS sysplex might have moved from one computer system to another. This is often done to help balance computer resources, or it can occur when the sysplex recovers from a failure of one of the computers in the sysplex.

As best understood, the above cited section merely describes the general problem of resynchronizing a client with a single DBMS server after the DBMS server has failed and restarted. This section makes no reference to preset substitution information including an association between first and second DBMSs, where the association indicates that the second DBMS is to manage a storage area associated with the first DBMS in addition to its own storage area as recited in amended claim 1.

Column 3, lines 49-65 of Cotner states:

A network such as SNA provides its own network solution to the above stated problem. For example, VTAM LU 6.2 is communication software that allows systems, such as in a sysplex environment, to communicate between each other. The network management product VTAM LU 6.2 runs in a layer above the DBMS product. With the SNA network protocol managed VTAM, each DBMS member is uniquely identified via an LU name. The same LU name is used even if a DBMS fails and restarts on a different computer system. When the DBMS moves, the network name moves with it. As such, the network address of the DBMS does not change. Because the LU name is associated with the DBMS and the LU name moves with the DBMS when then the DBMS moves from one system to another, it is possible for the client system to use the DBMS LU name for network routing, regardless of which system house the DBMS.

As best understood, the above cited section merely describes a naming scheme used by SNA networks where each DBMS member in a DBMS sysplex is assigned a unique LU name. Like the previous cited section of Cotner, this section makes no reference to preset substitution information including an association between first and second DBMSs, where the association indicates that the second DBMS is to manage a storage area associated with the first DBMS in addition to its own storage area as recited in amended claim 1.

Figure 2 of Cotner is a system diagram illustrating DBMSs 5021, 5022, 5023 running on computers 201, 202, 203 respectively. The diagram also illustrates a global list 215 of mappings between resynchronization port numbers and TCP/IP addresses. As best understood, the Examiner construes global list 215 as teaching the “preset substitution information” of Applicants’ claim 1. However, as discussed above, each mapping in global list 215 simply identifies the network address of a host computer running a given DBMS. For example, as shown in Figure 2 of Cotner, the first row of global list 215 indicates that DBMS 5021 is running on computer 201 with network address XXA, DBMS 5022 is running on computer 202 with network address XXB, and DBMS 5023 is running on computer 203 with network address XXC. Thus, at best, each mapping in global list 215 merely represents an association between a computer and a DBMS. In contrast, claim 1 specifically recites that the preset substitution information includes an association between a first DBMS and a second DBMS. Accordingly, the global list of Cotner fails to teach or suggest “obtaining preset substitution information including an association between the first DBMS and the second DBMS” as recited in amended claim 1. (Emphasis added).

Further, Cotner is completely silent on the concept of an association between first and second DBMSs, wherein the association indicates that the second DBMS is to manage a storage area associated with the first DBMS (i.e., first storage area) in addition to its own storage area (i.e., second storage area) as recited in amended claim 1. As best understood, each time a DBMS server in the system of Cotner is restarted, the DBMS server remains associated with its original storage area. This is apparently necessary so that a client resynchronizing with a restarted DBMS server can access the same storage area as before and thereby complete uncompleted work units. Accordingly, Cotner also fails to teach or suggest “obtaining preset substitution information including an association between the first DBMS and the second DBMS, wherein the association indicates that the second DBMS is to manage the first storage area in addition to the second storage area” as recited in amended claim 1. (Emphasis added).

The deficiencies of Cotner in this regard are not remedied by Vosseler. For example, Applicants have not found (and the Examiner does not provide a citation to) any

section in Vosseler that teaches or suggests “obtaining preset substitution information including an association between the first DBMS and the second DBMS, wherein the association indicates that the second DBMS is to manage the first storage area in addition to the second storage area” as recited in amended claim 1.

Further, since Cotner and Vosseler do not teach anything about the recited preset substitution information of claim 1, Cotner and Vosseler necessarily fail to teach or suggest “based on the preset substitution information, sending the request to the second DBMS running on the second computer, wherein the second DBMS is configured to access the first storage area and process the request” as recited in amended claim 1. (Emphasis added).

For at least the foregoing reasons, even if Cotner and Vosseler were combined (although there appears to be no rationale for combining), the resultant combination would not teach or suggest the various features of Applicants’ amended claim 1. Accordingly, Applicants respectfully request that the rejection of claim 1 be withdrawn.

Independent claim 12 has been amended to recite features that are substantially similar to independent claim 1, and is thus believed to be allowable for at least a similar rationale as discussed for claim 1, and others.

Independent claims 34 and 37 recite features that are substantially similar to independent claim 1, and are thus believed to be allowable for at least a similar rationale as discussed for claim 1. In addition, claims 34 and 37 recite additional features that distinguish over Cotner and Vosseler. For example, claim 34 recites, in part:

determining a substitute database access server for the target database access server based on the preconfigured substitution information;
modifying the processing request to include a substitution instruction;
and
transmitting the modified processing request to the substitute database access server, wherein the substitute database access server is configured to identify the substitution instruction in the modified processing request, obtain execution environment information for the target database access server, switch an execution environment of the substitute database access server to that of the target database access server based on the execution

environment information, and process the processing request on behalf of the target database access server.

(Applicants' claim 34, in part).

Similar features are recited in claim 37. No disclosure pertaining to these features could be found in Cotner and/or Vosseler. Accordingly, Applicants submit that claims 34 and 37 are allowable for at least this additional reason.

Dependent claims 2-5, 13-16, 35, 36, 38, and 39 depend (either directly or indirectly) from independent claims 1, 12, 34, and 37 respectively, and are thus believed to be allowable for at least a similar rationale as discussed for claims 1, 12, 34, and 37, and others.

Dependent claims 6, 7, 17, and 18 have been canceled without prejudice, and thus the rejection of these claims is moot.

New Claims 40-43

New claims 40-43 have been added to cover various embodiments of the present invention. In particular, claims 40-43 incorporate features from currently amended claims 1, 12, 34, and 37 respectively, as well as features from previously presented claims 6 and 7. During the Examiner interview, the Examiner indicated that claims incorporating these features may be allowable. Applicants submit that no new matter has been added.

Since claims 40-43 recite features that are substantially similar to independent claims 1, 12, 34, and 37, claims 40-43 are believed to be allowable over Cotner and Vosseler for at least a similar rationale as discussed for claims 1, 12, 34, and 37.

Further, Applicants submit that claims 40-43 recite additional features that distinguish over Cotner and Vosseler. For example, claims 40-43 recite, in part "wherein the preconfigured substitution information includes a plurality of mappings between database access servers, each mapping including priority information indicating a priority of said each mapping with respect to other mappings." In the Office Action, the Examiner asserts (with respect to previously presented claim 6) that this feature is shown in Cotner at col. 5, lines 7-37. However, the cited section of Cotner merely describes the process of resynchronizing a client with a DBMS server based on the DBMS server's resynchronization port number. As best understood,

the cited section makes no reference at all to the recited "priority information" of claims 40-43. The deficiencies of Cotner in this regard are not remedied by Vosseler. Accordingly, Applicants submit that claims 40-43 are allowable for at least this additional reason.

Amendments to the Claims

Unless otherwise specified, amendments to the claims are made for purposes of clarity, and are not intended to alter the scope of the claims or limit any equivalents thereof. The amendments are supported by the specification and do not add new matter.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance and an action to that end is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,

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